



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
SOLID WASTE AND EMERGENCY  
RESPONSE

From: Chris Rhyne and Nancy Hunt

To: Stephen Heare, Acting Director  
Permits and State Programs Division

Subject: Report on Site Visit to Calvert Cliffs Nuclear Power Plant  
Baltimore Gas and Electric Company

**Purpose, Location, and Participants**

At the invitation of the facility, members of the EPA mixed waste team conducted a site visit on January 23, 1998, to gather information concerning the generation, storage and disposal of mixed wastes. The site is located about 2 hours from EPA Headquarters in Lusby, (Calvert County) Maryland. The facility is reached via Route 4, and borders the Chesapeake Bay. Due to the proximity of the plant to EPA Headquarters, the fact that this was the first site visit for gaining information for the mixed waste rule, and the high interest of EPA Headquarters staff in learning about nuclear power plant operation, a relatively large number of federal employees attended. As a result the visit concentrated most on how the plant operates, rather than a more focussed discussion related to mixed waste. However, many of the participant found this operational overview extremely helpful and informative.

Participants included:

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## **Background**

The Calvert Cliffs Nuclear Power Plant (“the facility”) is a pressurized water reactor (PWR), located on a 2300 acre site. It has been generating electricity for more than 20 years: Unit 1 began operating in 1975; Unit 2 in 1977. Calvert Cliffs has an NRC license for 40 years (expiration in 2015). The facility has under consideration a request to NRC for license extension/renewal when the current one expires.

The tour began with an informative description of the operation of a nuclear power plant. The fuel, rather than fossil fuels such as coal, gas or oil, is supplied by nuclear fuel pellets which are sealed inside 12 foot rods that are bundled to form fuel assemblies. A total of 217 fuel assemblies in the reactors provide the energy needed to heat the steam which turns the turbines. Because Calvert Cliffs is a PWR, the hot water heated directly by the fuel assembly is under pressure to keep from boiling. This water, which is in a closed system of tubes, heats the second water system in the heat exchangers or steam generators, and is recycled to be reheated. Meanwhile the steam turns the blades on the turbine, making it spin, causing the magnets inside the generators’ wire coils to spin, producing electricity.

The steam from the turbines is routed to the condenser where it is cooled by water from the Chesapeake Bay. The plant produces 200 million BTU’s of waste heat/minute. Cooling towers are often used to allow this heat to escape into the atmosphere. However, at this location because of the brackish water, cooling towers were judged to be harmful to plants in the surrounding area. Instead the facility uses 2 and ½ million gallons per minute of bay water to condense the steam used by the turbines. On average the bay water is heated about 10 degrees F. The facility cannot exceed by regulation a 12 degree F increase in bay water discharged. Since the heat transfers to the steam generator but the radioactivity does not, the turbine, condenser, and generator do not have to be in a radiation controlled area. PWRs generate less incidental mixed waste as a result of this process design. In addition, PWRs do not generate as much mixed wastes during planned maintenance activities in the turbine building or auxiliary buildings as boiled water reactors may.

## **Permit Status Under RCRA**

The State of Maryland at present is authorized for the base program under RCRA but has not been authorized for mixed waste. As a result the federal RCRA program does not have jurisdiction. Once the state picks up authorization for mixed waste, facilities generating or storing mixed waste can apply for interim status and subsequently submit a RCRA Part B permit application. Calvert Cliffs is currently subject to State of Maryland law regarding applicability of RCRA on site. It is our understanding that the facility gets newly generated hazardous wastes off site within 90 days. When Maryland becomes authorized for mixed waste, the facility may need to apply for a permit or interim status. However, based upon the site visit of January 23, 1998 Calvert Cliffs appeared to be meeting national RCRA requirements for safe storage and management of its mixed waste in a frequently monitored, separate, fenced and locked storage facility with secondary containment in place in case a drum begins to leak.

### **Wastes Produced and Wastes Currently On-Site**

The facility general manager, Peter Katz, responded to questions regarding current waste production and storage. He indicated that last summer they had 22 (55 gallon) drums of mixed wastes, including solvents, paints, as well as a drum of grease, and another of debris and personal protective equipment. Last summer they consolidated these wastes and sent 11 drums of liquids to DSSI (at what BGandE called a one-time blue plate special rate.) DSSI takes only pumpable liquids, and required wastes to be prescreened prior to acceptance to reduce the mixed wastes they store on site prior to treatment. (Ash from DSSI treatment is sent to Envirocare in Utah for ultimate disposal.)

Calvert Cliffs greatest waste stream (about 70 percent) is liquid in which there are trace amounts of radioactivity. Wastes currently generated include metals--chrome, arsenic, and selenium. On average 500 cubic feet of low level Class A waste is generated annually (which is approximately equivalent to one dump truck load of waste). In the future, facility managers expect increased volumes of paint solids during the process of decommissioning. To extend the life of the unit, Calvert Cliffs' management anticipates using a cleaning operation for steam generator replacement which will use organic solvents, generating additional, but one-time, mixed wastes.

### **Waste Minimization Efforts**

Because of a switch to water-based paints, Calvert Cliffs is no longer regularly generating F coded wastes previously generated. However, the facility's use of lead-based paints in the past will add to the volume of mixed wastes generated at decommissioning. The facility has instituted an aggressive chemical control program. A screening process is in place to limit bringing in chemicals which will result in hazardous wastes that could become mixed wastes.

### **Disposition of Wastes Generated**

Maryland is in the Appalachian compact. The low level radioactive waste (LLRW) disposal facility for this compact was to have been in Pennsylvania. However, by compact agreement facilities in Maryland are allowed to use the Barnwell land disposal facility in S.C. Calvert Cliffs sends approximately 500 cubic feet of LLRW to Barnwell annually.

Wastes associated with spent fuel rods are of continued concern for the facility. At

present there is no disposal facility available off site for this waste. Packaging of nuclear fuel, which is spent after 4-6 years of use, is done in sealed steel canisters. Rods are placed in canisters and sealed in an inert environment--helium gas. The canisters are enclosed in heavy duty (reinforced) concrete vaults on site. For interim storage, Calvert Cliffs has built above ground dry cask storage units which allow safe decay for spent fuel rods. The dry storage facility is double fenced to prevent intruder access. Concrete closures on the vaults further limit inappropriate accessibility. Storage relies on air circulating through the shelters to cool the fuel.

### **Storage of Mixed Wastes at the Facility**

Calvert Cliffs has on-site 5 (55 gallon) drums of legacy mixed wastes, which are clearly marked with radiation symbols and state the kinds of hazardous wastes the drum contains on the label. The drums include: one drum of solvent contaminated protective equipment and debris; one drum of grease; and three drums of paint solids.

All storage of mixed waste occurs in containers. During the tour we observed the separate, locked building which houses all mixed waste drums. It was within a fenced perimeter and had secondary containment features in place in case of a spill or leakage of one of the drums.

### **Summary of Facility Tour**

During the facility tour, we observed: the intake area from the Chesapeake Bay and associated filtering mechanisms; the outflow into the bay (at a distance); the simulator, a replica of the control room for the entire plant which is used for training; the outside areas including spent fuel rod dry storage cask containment area; the mixed waste container storage area; and the turbine and generator area. The reactor and process areas were immaculate. The outdoor areas including the mixed waste drum storage facility seemed to be in good condition. There was no evidence of leaking or deteriorating drums. Considerable security processing was required to enter the building and limited access sites. Despite an extremely rainy, windy day, our hosts were very cordial, answered questions, and agreed to supply some additional information.